IN THE CLAIMS:

Please cancel all claims without prejudice and add the following claims:

35. An encoder for encoding video signals, comprising:

a processing circuit to generate blocks of video data from a video information signal;

a transform circuit to generate DC luminance coefficients, DC chrominance coefficients, and AC chrominance coefficients for each of said blocks;

a quantizer circuit to

- receive a quantization parameter for each of said blocks,
- scale said luminance coefficients by a luminance scaling function, $Q_{luminance}(p)$, that is at least three-segment piece-wise linear function, where p is a coefficient value;
- scale said chrominance coefficients by a chrominance scaling function, $Q_{chrominance}(p)$, that is at least three-segment piece-wise linear function; and
- quantize said luminance according to said luminance scaling function, and chrominance coefficients according said chrominance scaling function transformation of said quantization parameter, each said quantization parameter being a function of a given channel transmission rate and at least one factor that affects number of bits that are allocated to coding said block; and

a variable length coder to generate a variable length code based on the quantized luminance and chrominance coefficients.

36. The encoder of claim **35**, said luminance and chrominance scaling functions are independent of variables other than p.

37. The encoder of claim **35**, wherein at low values of said quantization parameter both said luminance scaling function and said chrominance scaling function approximate constant scaling functions, at high values of said quantization parameter said luminance scaling function approximates 2 times said quantization parameter, and said chrominance scaling function approximates said quantization parameter.

38. The encoder of claim **37** where value of said chrominance scaling function for a given coefficient level, p, is lower than value of said chrominance scaling function for said given coefficient level, for all coefficient levels.

39. The encoder of claim **37** wherein said quantizer divides DC luminance coefficient p by value of said luminance scaling function at p, and divides DC chrominance coefficient p by value of said chrominance scaling function at p.

40. A decoder for decoding encoded video signals, comprising:

a variable length decoder to generate quantized video coefficients from variable length code contained within the encoded video signals,

a dequantizer circuit to identify a quantization parameter, $Q(p)$, with each block associated with the encoded video signals and to dequantize the video coefficients according to an at least three-segment piece-wise linear transformation of the quantization parameter

an inverse transform circuit that derives a DC luminance dequantization parameter from said quantization parameter, to transform the dequantized video coefficients into blocks of video data, and

a processing circuit to generate a video signal from the blocks of video data.

41. The decoder of claim **40**, wherein:

the encoded video signals contain encoded luminance signals;

the variable length decoder to generate quantized luminance coefficients based on the variable length code;

the dequantizer circuit to dequantize the luminance coefficients;

the inverse transform circuit to generate blocks of luminance data from the luminance coefficients; and

the processing circuit to generate a luminance signal from the blocks of luminance data.

42. The decoder of claim **40**, wherein:

the encoded video signals contain encoded DC chrominance signals;

the variable length decoder to generate quantized DC chrominance coefficients based on the variable length code;

the dequantizer circuit to dequantize the DC chrominance coefficients;

the inverse transform circuit to generate blocks of DC chrominance data from the DC chrominance coefficients; and

the processing circuit to generate a DC chrominance signal from the blocks of DC chrominance data.

43. The decoder of claim **40**, wherein:

the encoded video signals contain encoded AC chrominance signals;

the variable length decoder to generate quantized AC chrominance coefficients based on the variable length code;

the dequantizer circuit to dequantize the AC chrominance coefficients;

the inverse transform circuit to generate blocks of AC chrominance data from the AC chrominance coefficients ; and

the processing circuit to generate a AC chrominance signal from the blocks of AC chrominance data.

44. A method of encoding a video signal, comprising the steps of:

organizing video data into blocks of luminance data and blocks of chrominance data;

coding the luminance blocks as DC luminance coefficients;

coding the chrominance blocks as DC and AC chrominance coefficients;

quantizing the DC luminance coefficients according to a first transformation of a quantization parameter Q_p;

quantizing the DC chrominance coefficients according to a second transformation of the quantization parameter Q_p;

quantizing the AC chrominance coefficients according to a third transformation of the quantization parameter Q_p; and

variable length coding the on the quantized coefficients.

45. The method of claim **44**, further comprising:

outputting an identifier of the quantization parameter Q_p in a fixed length code, the code representing a change in the quantization parameter Q_p with reference to a previous value of the quantization parameter Q_p.

46. The method of claim **45**, wherein the code corresponds to an index into an update table of permissible quantization parameter Q_p changes for a given current quantization parameter Q_p level.

47. A method of decoding an encoded video signal, comprising the steps of:

extracting quantized DC luminance coefficients, quantized DC chrominance coefficients, and quantized AC chrominance coefficients from a variable length code;

dequantizing the quantized DC luminance coefficients according to a first inverse transformation of a quantization parameter Q_p;

dequantizing the quantized DC chrominance coefficients according to a second inverse transformation of the quantization parameter Q_p;

dequantizing the quantized AC chrominance coefficients according to a third inverse transformation of the quantization parameter Q_p;

transforming the dequantized DC luminance coefficients into blocks of luminance data;

transforming the dequantized DC and AC chrominance coefficients into blocks of chrominance data; and

combining the luminance and chrominance blocks into a video signal.

48. The method of claim **47**, further comprising:

extracting from the variable length code a fixed length code representing a change in the quantization parameter Q_p with reference to a previous value of the quantization parameter Q_p.

49. The method of claim **48**, wherein the code corresponds to an index into an

update table of permissible quantization parameter Q_p changes for a given current quantization parameter Q_p level.

50. A video coding system, including:

a video encoder comprising:

means for generating blocks of video data from a received video signal, transforms the blocks of video data into representative video coefficients,

means for quantizing the video coefficients according to an at least three segment piece-wise linear transformation of a received quantization parameter Q_p,

means for generating an encoded video signal based on the quantized video coefficients, and

means for outputting the encoded video signal to a channel; and

a video decoder comprising:

means for generating quantized video coefficients from the encoded video signal received from the channel,

means for identifying the quantization parameter Q, associated with the encoded video signal,

means for dequantizing the quantized video coefficients according to an at least three segment piece-wise inverse linear transformation of the identified quantization parameter Q_p,

means for transforming the dequantized video coefficients into blocks of video data, and

means for generating a representation of a video signal from the blocks of video data.

51. The video coder of claim **50**, further comprising:

means .for embedding a quantization parameter update in a fixed length code within the encoded video signal, the code representing a change in the quantization parameter with reference to a previous value of the quantization parameter; and

means for updating the quantization parameter based on the quantization parameter update.

52. An encoded video signal produced according to the method identified in claim **44**.

53. An encoded video signal produced according to the method identified in claim **45**,

54. An encoded video signal produced according to the method identified in claim **46**.

55. In a video coding system in which encoders and decoders operate upon common quantization parameters, a method of reporting an update to a quantization parameter, comprising:

determining a desired change in the quantization parameter at the encoder; and

coding the desired change in a fixed length code, the code representing an index into an update table of permissible quantization parameter changes for a range of current quantization parameters.

56. A decoding method for a coded image data signal, the coded image data signal including data of a plurality of macroblocks and further of a plurality of blocks that are members of the macroblocks, each macroblock including up to four luminance blocks and up to two chrominance blocks, the method comprising:

decoding coded intra macroblock data by:

identifying from the signal quantization parameter data for the macroblock,

generating a luminance scalar according to a first piece-wise linear transformation of the quantization parameter,

generating a chrominance scalar according to a second piece-wise linear transformation of the quantization parameter,

for each of up to four luminance blocks that are members of the macroblock, inverse quantizing a DC coefficient of the luminance block by the

luminance scalar,

for each of up to two chrominance blocks that are members of the macroblock, inverse quantizing a DC coefficient of the chrominance block by the chrominance scalar,

transforming data of the blocks, including the respective inverse quantized DC coefficient, according to an inverse discrete cosine transform, and

merging data of the blocks to generate image data of the macroblock.

57. The decoding method of claim **56**, wherein coded image data signal identifies, for at least one macroblock, is a differential update, representing a change in the quantization parameter over a quantization parameter from a previously-coded macroblock.

58. The decoding method of claim **56**, further comprising, prior to the inverse quantizing, predicting a scaled DC coefficient of a block according to a gradient prediction analysis.

59. The decoding method of claim **56**, further comprising, responsive to a first state of a prediction flag, decoding AC coefficient signal in the coded image data signal a residual signal according to an AC prediction.

60. The decoding method of claim **59**, further comprising, responsive to a second state of the prediction flag, decoding the AC coefficient signals according to an inverse discrete cosine transform.

61. An image coding method, comprising:

identifying luminance and chrominance components of an image data signal,

organizing spatial areas of the image data signal into macroblocks and further to blocks, wherein a macroblock includes up to four blocks of luminance data and two blocks of chrominance data,

transforming each luminance block and each chrominance block according to a

discrete cosine transform, generating DCT coefficient data for each block,

for each macroblock:

determining a quantizing parameter,

generating a luminance scalar based on a piece-wise linear transform of the quantizing parameter,

generating a chrominance scalar based on a piece-wise linear transform of the quantizing parameter,

scaling a DC coefficient of each luminance block according to the luminance scalar,

scaling a DC coefficient of each chrominance block according to the chrominance scalar, and

transmitting an identifier of the quantization parameter and each scaled DC coefficient via a channel.

62. The method of claim **57**, wherein the identifier of the quantization parameter for at least one macroblock is a differential update, representing a change in the quantization parameter over a quantization parameter from a previously-coded macroblock.

63. The method of claim **57**, further comprising predicting a scaled DC coefficient of a block from a gradient prediction analysis, wherein the identifier of the respective DC coefficient represents results of the prediction.

64. The method of claim **57**, wherein the discrete cosine transform generates AC coefficients

for at least one block, the method further comprising transmitting the AC coefficients of the block.

65. The method of claim **57**, wherein the discrete cosine transform generates AC coefficients for at least one block, the method further comprising:

predicting AC coefficients of the block,

generating AC residuals for the block, and

transmitting the AC residuals.

66. The method of claim **57**, further comprising transmitting a flag signal for a block to indicate whether AC coefficients or AC prediction residual of the block are to be transmitted.

67. An image coder comprising:

an image preprocessing circuit to identify, from an image signal, luminance and chrominance components thereof and to organize the image signal into macroblocks and blocks, each macroblock having up to four luminance blocks and up to two chrominance blocks,

a DCT circuit, to generate from respective blocks identified by the image preprocessing circuit coefficient data of the blocks according to a discrete cosine transform, and

a quantizer to quantize DC coefficients blocks within each macroblock according to a quantization parameter assigned to the macroblock, wherein DC coefficients of luminance blocks are scaled according to a first piece-wise linear transform of the quantization parameter

and DC coefficients of chrominance blocks are scaled according to a second piece-wise linear transform of the quantization parameter.

68. The image coder of claim **67**, further comprising:

a predictor to predict DC coefficient data of the blocks according to a gradient prediction analysis, and

a variable length coder coupled to the predictor.

69. An image decoder, to decode a coded data signal, the signal identifying coded data for a plurality of macroblocks, each macroblock including coded data for up to four luminance blocks and up to two chrominance blocks, the coded data signal including an identifier of a quantization parameter for each macroblock, the decoder comprising:

a scalar to inverse quantize scaled DC coefficients of the blocks,

wherein a DC coefficient of each luminance block is inverse quantized according to a luminance scalar generated from a piece-wise linear transformation of the quantization parameter to which the respective luminance block belongs,

wherein a DC coefficient of each chrominance block is inverse quantized according to a chrominance scalar generated from a piece-wise linear transformation of the quantization parameter to which the respective chrominance block belongs,

an inverse transform circuit to perform an inverse discrete cosine transform of the blocks, including the inverse quantized DC coefficients,

a post-processing circuit to generate reconstructed image data from the inverse transformed block data.

70. The image decoder of claim **69**, further comprising:

a variable length decoder, and

a prediction circuit to predicted the DC coefficient data for the blocks according to a gradient prediction analysis.